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Observations of the Satellites of Saturn in 1893.

By the Rev. Alex. Freeman, M.A.

The observations were made with a refractor equatorially mounted and having an aperture of $6\frac{1}{2}$ inches; the focal length is nearly thirteen times the aperture. The power used was 116, being found most suitable for the purpose. By the term conjunction is meant a coincidence of position on a line normal to the ring-axis of *Saturn*. Results only are given for the moment of conjunction, though divergence from conjunction within 5^{m} before and after the actual conjunction was usually also noted. Greenwich Mean Time is employed.

February 3^{d} 12^{h} $14^{m}\cdot7$, *Enceladus* seen very near west elongation, due $12^{h}\cdot35$.

February 3^{d} 13^{h} $17^{m}\cdot4$, *Enceladus* was co-linear with *Tethys* and *Dione*, both south of line of ring-axis.

February 3^{d} 13^{h} $38^{m}\cdot0$, *Rhea* and *Tethys* very nearly in conjunction normally to ring-axis, and about one equatorial diameter of ♄ preceding west end of ring. The calculated distances of Rh. and Te. from polar axis of ♄ are $44''\cdot66$ and $44''\cdot46$ for the observed time.

February 14^{d} 12^{h} 1^{m}, *Rhea* very closely followed north part of ball of ♄, and was not yet up to the east tangent at end of *Saturn's* equator.

March 15^{d} 10^{h} 40^{m}, *Tethys* not yet up to west end of ring, cloudy soon after. (Te. θ, $10^{h}\cdot7$, Marth.)

March 19^{d} 11^{h} 18^{m}, *Tethys* half-ansa length from the ball of ♄ east. Within $0''\cdot9$ of tabular place.

April 12^{d} 11^{h} $45^{m}\cdot2$, *Dione*, south preceding, opposite middle point of line joining inner and outer ring-ends.

April 17^{d} 11^{h} $5^{m}\cdot7$, *Tethys* not quite up to east end of ring. 11^{h} $8^{m}\cdot2$, *Tethys* almost quite up. It then became cloudy. (Te. ζ, $11^{h}\cdot2$, Marth.)

April 20^{d} 9^{h} $53^{m}\cdot5$, *Dione* now fully up to east ring-end, south. (Di. ζ, $10^{h}\cdot1$, Marth.)

April 23^{d} 10^{h} 44^{m}, *Dione* was in conjunction with west end of Cassini division, south of ring.

April 23^{d} 11^{h} 19^{m}, *Dione* in conjunction with west end of ring, south. (Di. η, $11^{h}\cdot4$, Marth.)

April 30^{d} 10^{h} $49^{m}\cdot8$, *Titan* is now on the south polar axis of *Saturn* produced. The distance between the limbs of

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Titan and *Saturn* equal to the polar radius of *Saturn*. The Washington N.A. gives inferior conjunction south at 11^{h} 14^{m}·2 G.M.T.

April 30^{d} 10^{h} 55^{m}, *Tethys*, *Dione*, and *Iapetus* nearly co-linear, *Dione* perhaps a little east of the line.

May 5^{d} 9^{h} 23^{m}·5, *Tethys* just up to west ring-end north. 9^{h} 33^{m}·5 decidedly past. (Te. θ, 9^{h}·6, Marth.)

May 5^{d} 11^{h} 7^{m}·5, *Dione* just up to west ring-end north. (Di. θ, 11^{h}·2, Marth.)

May 9^{d} 11^{h} 19^{m}, *Tethys* very little beyond east ring-end north. (Te, ϵ, 11^{h}·1, Marth.)

May 10^{d} 10^{h} 17^{m}, *Tethys* had a little passed west ring-end south. (Te. η, 9^{h}·7, Marth.)

May 16^{d} 9^{h} 13^{m}·5, *Titan* had passed the south polar axis produced by one-fifth of the equatorial radius of ♄. He was distant from the south pole at least the polar radius of ♄. Washington N.A. gave inferior conjunction south at 9^{h}·23 G.M.T. (An observer at Brighton with $10\frac{1}{2}$-inch reflector made *Titan* to be on the polar axis at 8^{h} 55^{m}.)

May 16^{d} 9^{h} 54^{m}, *Dione* in conjunction with west ring-end north. (Di. θ, 9^{h}·9, Marth.)

May 27^{d} 8^{h} 34^{m}·4, *Dione* in conjunction with west ring-end north. (Di. θ, 8^{h}·6, Marth.)

May 27^{d} 9^{h} 27^{m}·4, *Tethys* in conjunction with Cassini division at west end, south.

May 27^{d} 9^{h} 38^{m}·9, *Tethys* in conjunction with west ring-end south. (Te. η, 9^{h}·5, Marth.)

June 2^{d} 8^{h} 53^{m}, *Rhea* in conjunction with *Tethys* on the west of *Saturn*. The distance of the centres of the satellites about equal to polar radius of ♄. By Marth's ephemeris, *Rhea* 44″·29 west and 7″·01 north, whilst *Tethys* 44″·38 west and 0″·27 south. Polar radius of *Saturn* is 8″·02. The agreement in distance from the polar axis of ♄ is within 0″·1.

Murston Rectory, Sittingbourne:
1893 *June* 5.

Observations of Comet 1892 *d* (*Brooks*) made at the Royal Observatory, Cape of Good Hope.

(*Communicated by D. Gill, LL.D., F.R.S., H.M. Astronomer.*)

1893.	Cape Mean Time.	Comet−Star. Δ α.	Comet−Star. Δ δ.	No. of Comps.	Observer.	Comet's App. R.A.	Log. (*p*×Δ).	Comet's App. Dec.	Log. (*p*×Δ).	Reduction to App. Place.		Comp. Star No.
	h m s	m s	′ ″			h m s		° ′ ″		s	″	
Jan. 16	14 59 51·2	−1 25·21	+2 55·8	9-8	F.	15 42 43·32	9·8014*n*	−41 55 31·6	0·3625*n*	−1·66	+4·1	1
18	15 3 20·9	−3 9·37	+0 54·1	6-8	F.	15 52 3·89	9·8005*n*	−42 4 28·3	0·3477*n*	−1·63	+3·4	2
23	14 46 55·9	−0 49·06	+1 8 1	12-12	F.	16 14 9·50	9·8113*n*	−42 14 27·0	0·4190*n*	−1·54	+2·2	3
24	14 49 26·6	−1 17·78	−1 8·7	12-12	F.	16 18 23·45	9·8104*n*	−42 14 33·6	0·4110*n*	−1·53	+1·9	4
28	14 56 34·5	−2 16·48	+1 39·3	12-8	F.	16 34 36·80	9·8068*n*	−42 9 39·9	0·3883*n*	−1·45	+0·9	5
30	14 46 35·9	−0 45·17	+3 45·8	12 8	F.	16 42 15·92	9·8107*n*	−42 4 26·1	0·4237*n*	−1·39	+0·5	6
Feb. 16	14 59 48·4	+2 0 64	−4 0·4	12-8	F.	17 36 44·85	9·7872*n*	−40 28 26·7	0 3547*n*	−0·93	−2·2	7
18	14 52 55·5	+1 11·91	−1 54·0	12-8	F.	17 41 55·59	9·7883*n*	−40 13 17·9	0·3740*n*	−0·87	−2·4	8
19	14 44 59·2	+1 43·91	−2 15·7	12-8	F.	17 44 25·19	9·7902*n*	−40 5 36·5	0·3993*n*	−0·84	−2·5	9
20	14 52 8·7	−2 29·21	−2 44·9	12-8	F.	17 46 52·21	9·7848*n*	−39 57 41·5	0·3701*n*	−0·83	−2·7	10
21	14 44 7·8	−0 42·47	−0 12·2	12-8	F.	17 49 14·62	9·7876*n*	−39 49 45·6	0·3964*n*	−0·79	−2·7	11
22	14 44 15·4	−1 30·56	−2 9·8	12-8	F.	17 51 34·15	9·7859*n*	−39 41 40·2	0·3915*n*	−0·77	−2·8	12
Mar. 16	14 54 19·8	−1 49·96	−1 45·2	11-8	F.	...	9·7188*n*	...	0·2248*n*	−0·09	−3·8	13
17	14 50 10·4	+3 13·46	+1 1·3	12-8	F.	...	9·7190*n*	...	0·2358*n*	−0·03	−3·8	14
18	14 41 40 0	−1 8·35	+1 10·5	12-8	F.	...	9·7245*n*	...	0·2610*n*	−0·02	−3·8	15
22	14 54 54·0	−2 29·68	+0 30·3	12-8	F.	18 34 39·78	9·6894*n*	−35 44 21·2	0·1691*n*	+0·11	−3·9	16
25	14 49 42·0	+1 31·33	−4 0·0	12-8	F.	18 36 53·92	9·6810*n*	−35 19 22·8	0·1635*n*	+0·23	−4·0	17
26	14 52 11·6	+2 10·06	+4 16·6	12-8	F.	18 37 32·68	9·6719*n*	−35 11 6·2	0·1418*n*	+0·26	−4·0	17
Apr. 14	14 8 36·1	+0 31·84	−0 53·3	12-8	F.	...	9·6134*n*	...	0·1225*n*	+0·91	−4·2	18
17	14 16 33·4	+0 42·38	+2 53·8	12-8	F.	...	9·5657*n*	...	0·0500*n*	+1·03	−4·3	19
20	13 45 48·2	−0 25·09	−3 16·3	12-8	F.	18 38 19·64	9·5999*n*	−31 52 7·2	0·1329*n*	+1·14	−4·5	20
23	13 10 50·3	−1 12·27	+1 46·6	12-8	F.	18 30 29·87	9·6282*n*	−31 25 3 2	0·2079*n*	+1·26	−4·7	21

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